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Heartwood in Second Growth Loblolly Pine

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Heartwood may be undesirable in southern pine pulpwood used for the manufacture of newsprint paper. Researches by the Pulp and Paper Laboratory of the Industrial Committee of Savannah, and by the Forest Products Laboratory, have shown that heartwood is not digested satisfactorily by the sulphite process and when it is present in large quantities, produces an objectionable color in ground wood pulp. Since it appears probable that the newsprint industry will develop in the loblolly pine region, it may be desirable that the pulpwood grower know when stands of second-growth loblolly pine should be cut to obtain pulpwood containing a limited amount of heartwood.

This technical note gives a preliminary summary of a recent study of the factors affecting the amount of heartwood present in second-growth loblolly pine trees. The results are based on detailed study of 680 trees growing in different second-growth stands in the Coastal Plain of Virginia, North Carolina, and South Carolina.

Although the formation of heartwood starts at ages between 14 and 23 years, practically no trees under 20 years of age contain an appreciable amount. From the available data no reason can be given why some trees start heartwood formation earlier than others.

The majority of the trees having heartwood showed a maximum heartwood diameter at the stump, but there were 23.5% with heartwood diameters smaller at the stump than at some point higher up the stem. There is no apparent explanation for this variation because it is not correlated with age, size, dominance, or rate of growth.

The amount of heartwood in the trees studied varied from none to 10 cubic feet. The smallest amounts of heartwood occur in young trees while the largest amounts are in large, old trees.

The amount of heartwood per tree is of relatively little importance to the grower and user, the proportion of heartwood to sapwood being much more pertinent. Investigation of this relationship shows that the proportion of heartwood varies directly with age and indirectly with rate of growth 1/. Thus for a given age the fast growing trees have a relatively small proportion of heartwood, while old trees growing at the same rate as younger trees have a larger percentage volume of heartwood. Figure 1 shows this graphically.

Since it is universally accepted that the average rate of current diameter growth of trees is higher in young stands than in old stands, in open stands than in dense stands, and on good sites than on poor sites, we can reason from the relationship shown in Figure 1 that trees growing in open stands on good sites will have less heartwood in proportion to their total volume than those growing on poor sites in dense stands. With this in mind, it is possible from Figure 1 to arrive at an approximate rotation age at which trees will contain a certain average percentage of heartwood. Thus, if it is desired to grow loblolly pines having practically no heartwood, the average rotation age should be approximately 20 years. If, however, heartwood amounting to 5% of the volume is acceptable, it is fairly safe to say that on the average site the rotation age should not exceed 45 years. On particularly good sites or in very open stands this could be raised to 50 years, while on poor sites or in very dense stands, the pulpwood should be cut at an age between 30 and 40 years.

These rotation ages are only approximate and are recommended only on the basis of heartwood as a limiting factor in the growth of loblolly pine for pulpwood. They do not take into account other factors such as the age at which loblolly pine stands should be cut to give the highest net return, the possible desirability of cutting some trees for other products, the effects of wood specific gravity on pulp yields, etc.

1/ Periodic diameter increment - 10 year period.

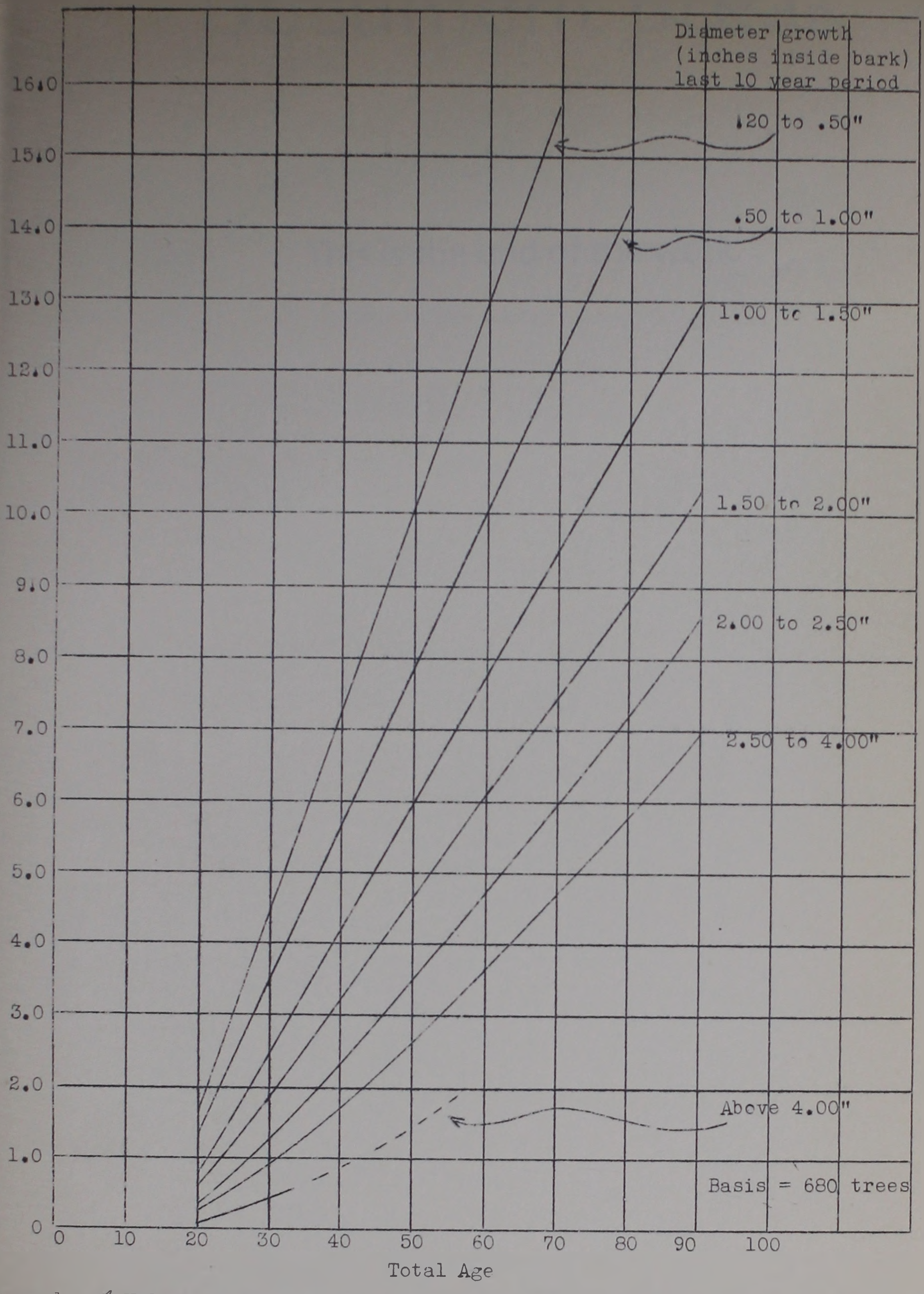

Figure 1.- % Volume of Heartwood per Tree by periodic increment and Age Classes.

Periodic increment = diameter growth (inches inside bark) last 10 years.